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INCORPORATING ORGANIC DYE INTO A POLYMETHYL METHACRYLATE MATRIX FOR SOLID DYE ACTIVE MEDIUM

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I am currently investigating incorporating organic dye into a polymethyl methacrylate (PMMA) matrix, which would result in an organic dye active medium in the solid form. The active medium is the optical amplifier of a laser. Organic dyes are used specifically for tunable lasers because their fluorescence is a small continuum of wavelengths. The lasing wavelength can be tuned with dispersive optical components, such as a diffraction grating or prism. The tunability of the dye laser is an important characteristic, which allows the operator to use one laser for many different tasks requiring different wavelengths. Characteristically, the organic dyes dissolved in alcohol and used in the liquid state. This poses problems for designers as well as operators. Modifications for a liquid active medium, such as a flow system, make the design of an organic dye laser cumbersome. Organic dyes are very toxic as well. The liquid form can be quite sloppy, increasing the chance of exposure if there is leak or malfunction. By using the dye in polymer form, the instability of a flow system would be alleviated as well as the risk of exposure to the toxic dyes. We have produced two forms of doped polymer: one with Rhodamine 6G dye and the other with Nile Blue dye. The Rhodamine sample will be excited by pulsed Nd:YAG laser while the Nile Blue sample will be excited by diode laser. The Nile Blue polymer dye samples are being synthesized in the lab and are currently being tested in standing wave optical cavity designs. Our findings will be used to further the design of safer and more stable optically pumped tunable dye lasers.